IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): An apparatus which performs a plasma process on a target substrate by using plasma, comprising:

an airtight process chamber which accommodates the target substrate;

a gas supply system which supplies a process gas into the process chamber;

an exhaust system which exhausts an interior of the process chamber and sets the interior of the process chamber to a vacuum state;

first and second electrodes arranged in the process chamber to oppose each other, an RF field, which turns the process gas into plasma by excitation, being formed between the first and second electrodes;

an RF power supply connected to the first or second electrode through a [[a]] first interconnection and configured to supply RF power;

a matching circuit arranged on the first interconnection and configured to ~~server~~ serve to automatically perform input impedance matching relative to the RF power;

an impedance setting section provided in addition to the matching circuit and arranged on the first interconnection, the impedance setting section being configured to set a backward-direction impedance as an impedance against an RF component including a higher harmonic of a fundamental frequency of the RF power and input from the plasma to the predetermined member, and capable of changing a value of the backward-direction impedance; and

a controller which supplies a control signal concerning a preset value of the backward-direction impedance to the impedance setting section,

wherein the impedance setting section comprises:

an impedance change unit connected to the first interconnection through a shunt, and

a filter disposed on the shunt between the first interconnection and the impedance change unit and configured to select a higher harmonic as a resonance target and to cut a component having the fundamental frequency of the RF power.

Claim 2 (Withdrawn): The apparatus according to claim 1, wherein the controller further comprises a storage which stores data concerning a correlation between first and second processes having different conditions and first and second preset values, corresponding to the first and second processes, of the backward-direction impedance, and the controller supplies to the impedance setting section a control signal which changes the backward-direction impedance from the first preset value to the second preset value on the basis of the data when a process to be performed in the process chambers changes from the first process to the second process.

Claim 3 (Original): The apparatus according to claim 1, wherein the preset value is set in advance such that a planar uniformity of the plasma process on the target substrate is improved.

Claim 4 (Original): The apparatus according to claim 1, wherein the preset value is set in advance such that the plasma stabilizes.

Claim 5 (Withdrawn): The apparatus according to claim 1, wherein the plasma processing apparatus is an etching apparatus, the target substrate has a mask layer having a pattern and a lower layer to be etched which is under the mask layer, and the preset value is so set in advance as to control a size to be processed of the lower layer.

Claim 6 (Previously Presented): The apparatus according to claim 1, wherein the impedance change unit comprises one or both of an arrangement which continuously changes the backward-direction impedance with a continuous variable element, and an arrangement which changes the backward-direction impedance stepwise by switching a plurality of fixed elements.

Claim 7 (Withdrawn): The apparatus according to claim 1, wherein the impedance setting section comprises a function which displays the preset value.

Claim 8 (Withdrawn): The apparatus according to claim 1, wherein the controller or the impedance setting section corrects the preset value with calibration data that compensates for a difference intrinsic to the impedance setting section, and then adjusts the backward-direction impedance.

Claim 9-10 (Cancelled).

Claim 11 (Previously Presented): The apparatus according to claim 1, wherein the value of the input impedance is so set by the impedance setting section as to be not less than twice a value of an RF load impedance formed by the process chamber and the plasma against the RF power.

Claim 12 (Previously Presented): An apparatus which performs a plasma process on a target substrate by using plasma, comprising:

an airtight process chamber which accommodates the target substrate;

a gas supply system which supplies a process gas into the process chamber;

an exhaust system which exhausts an interior of the process chamber and sets the interior of the process chamber to a vacuum state;

first and second electrodes arranged in the process chamber to oppose each other, an RF field, which turns the process gas into plasma by excitation, being formed between the first and second electrodes;

an RF power supply which is connected to the first or second electrode through a matching circuit and which supplies RF power, the matching circuit serving to automatically perform input impedance matching relative to the RF power;

an impedance setting section provided in addition to the matching circuit and connected, through an interconnection, to a predetermined member to be electrically coupled with the plasma in the plasma process, the impedance setting section being configured to set a backward-direction impedance as an impedance against one of a plurality of different higher harmonics relative to a fundamental frequency of the RF power input from the plasma to the predetermined member, and capable of changing a value of the backward-direction impedance; and

a controller which supplies a control signal concerning a preset value of the backward-direction impedance to the impedance setting section,

wherein the impedance setting section comprises:

an impedance change unit connected to the predetermined member through the interconnection, and

a filter disposed on the interconnection between the predetermined member and the impedance change unit and configured to select a higher harmonic as a resonance target and to cut a component having the fundamental frequency of the RF power.

Claim 13 (Original): The apparatus according to claim 12, wherein the predetermined member is selected from the first and second electrodes and the process chamber.

Claim 14 (Original): The apparatus according to claim 12, wherein the predetermined member comprises a focus ring disposed to surround the target substrate.

Claim 15 (Original): The apparatus according to claim 12, wherein the predetermined member comprises a rectifying plate disposed between a process space in the process chamber and an exhaust path.

Claim 16 (Previously Presented): The apparatus according to claim 12, wherein the impedance change unit comprises one or both of an arrangement which continuously changes the backward-direction impedance with a continuous variable element over the plurality of different higher harmonics, and an arrangement which changes the backward-direction impedance stepwise by switching a plurality of fixed elements.

Claim 17 (Cancelled).

Claim 18 (Previously Presented): The apparatus according to claim 12, wherein the filter has a high impedance of not less than 50Ω against harmonics other than a selected harmonic.

Claim 19 (Previously Presented): The apparatus according to claim 12, wherein the filter comprises a filter selected from the group consisting of a high-pass filter, bandpass filter, low-pass filter, and notch filter.

Claims 20-25 (Cancelled).

Claim 26 (Previously Presented): An apparatus which performs a plasma process on a target substrate by using plasma, comprising:

an airtight process chamber which accommodates the target substrate;

a gas supply system which supplies a process gas into the process chamber;

an exhaust system which exhausts an interior of the process chamber and sets the interior of the process chamber to a vacuum state;

first and second electrodes arranged in the process chamber to oppose each other, an RF field, which turns the process gas into plasma by excitation, being formed between the first and second electrodes;

first and second interconnections which are respectively connected to the first and second electrodes and which extend to an outside of the process chamber, the first and second interconnections forming part of an AC circuit including electrical coupling between the first and second electrodes;

a first RF power supply which is arranged on the first interconnection and which supplies first RF power;

a first matching circuit which is arranged on the first interconnection between the first electrode and the first RF power supply and which automatically performs input impedance matching relative to the first RF power;

an impedance setting section arranged on the first interconnection in addition to the first matching circuit, the impedance setting section being configured to set a backward-direction impedance as an impedance against an RF component input from the plasma to the

first electrode, and capable of changing a value of the backward-direction impedance, and the RF component including a harmonic of a fundamental frequency of the first RF power; and

a controller which supplies a control signal concerning a preset value of the backward-direction impedance to the impedance setting section,

wherein the impedance setting section comprises:

an impedance change unit connected to the first interconnection through a shunt, and

a filter disposed on the shunt between the first interconnection and the impedance change unit and configured to select a higher harmonic as a resonance target and to cut a component having the fundamental frequency of the RF power.

Claim 27 (Original): The apparatus according to claim 26, wherein a value of the input impedance is so set by the impedance setting section as to be not less than twice a value of an RF load impedance formed by the process chamber and the plasma against the first RF power.

Claim 28 (Original): The apparatus according to claim 26, further comprising:

a second RF power supply which is arranged on the second interconnection and which supplies second RF power; and

a second matching circuit which is arranged on the second interconnection between the second electrode and the second RF power supply and which automatically performs input impedance matching relative to the second RF power.

Claim 29 (Original): The apparatus according to claim 28, wherein the first RF power has a frequency higher than that of the second RF power.

Claim 30 (Original): The apparatus according to claim 29, wherein the first RF power has a frequency lower than that of the second RF power.

Claims 31-40 (Canceled).

Claim 41 (Currently Amended): The apparatus according to Claim [[10]] 1, wherein the impedance setting section is configured to adjust a circuit defining the backward-direction impedance to resonate with at least one of higher harmonics.

Claim 42 (Previously Presented): The apparatus according to Claim 12, wherein the impedance setting section is configured to adjust a circuit defining the backward-direction impedance to resonate with at least one of higher harmonics.

Claim 43 (Previously Presented): The apparatus according to Claim 26, wherein the impedance setting section is configured to adjust a circuit defining the backward-direction impedance to resonate with at least one of higher harmonics.

Claim 44 (Previously Presented): The apparatus according to claim 26, wherein the impedance change unit comprises one or both of an arrangement which continuously changes the backward-direction impedance with a continuous variable element, and an arrangement which changes the backward-direction impedance stepwise by switching a plurality of fixed elements.